

European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

COST Action TD1105

Focus Group Meeting on

Data Analysis of Aveiro Air Quality Sensors Intercomparison

WHO Collaborating Centre (CC) for Air Quality Management and Air Pollution Control - Federal Environment Agency (FEA)

Berlin, Germany, 17 April 2015

Action Start date: 01/07/2012 - Action End date: 30/06/2016 - Year 3: 2014-15 (*Ongoing Action*)

COST Action TD1105: Status of the Aveiro AQ Sensors Intercomparison and Plan for Database

 **cost**
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY



Michele Penza

Function in the Action: Action Chair

ENEA - Brindisi, Italy



FOCUS GROUP MEETING: BERLIN, Germany

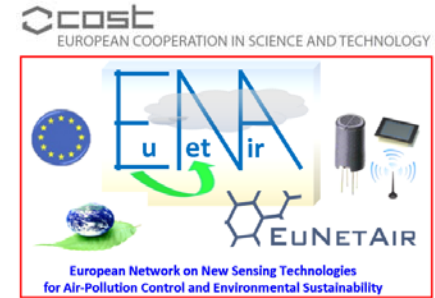
organized and hosted by WHO Collaborating Centre (CC) for Air Quality Management and Air Pollution Control - Federal Environment Agency (FEA)



AGENDA

17 April 2015 - Friday	
09:30 - 16:00	REGISTRATION
10:00 - 10:10	Welcome Address
10:10 - 11:30	Session 1: Oral Presentations
11:30 - 12:00	<i>Coffee Break</i>
12:00 - 13:10	Session 2: Oral Presentations
13:10 - 14:30	<i>Lunch</i>
14:30 - 16:30	Session 3: Discussion on Methodology and Preliminary Processing of Aveiro Database
16:30	<i>Closure of Meeting</i>

Outline



- **Aveiro Intercomparison:**
 - ✓ *Scientific context for Air Quality Control*
 - ✓ *AQ Sensors Joint-Exercise addressed by the Action*
- **Status of the Aveiro Database:**
 - ✓ *Summary and Reminder*
- **Aveiro AQ Sensors Database at Action Webpages:**
 - ✓ *Definitions and Further Processing*
- **Future Plans and Challenges: Expected Impact**
- **Concluding Remarks**

COST Action TD1105 *EuNetAir*: INTERCOMPARISON

New Sensing Technologies and Modelling for Air-Pollution Monitoring

- **Welcome Address from COST Action TD1105 EuNetAir**
- Dr. Michele Penza, Action Chair
ENEA, Technical Unit for Materials Technologies, Brindisi (Italy)



Aveiro Joint-Exercise Intercomparison & WG Meeting

13 - 27 October 2014: Starting Joint-Exercise (2 weeks duration)

14 - 15 October 2014: EuNetAir WG1-WG4 Meeting

EuNetAir Air Quality Joint-Exercise Intercomparison 2014

Local Organizers: Prof. Carlos Borrego and Dr. Ana Margarida Costa (IDAD)

Air Quality Monitoring campaign at Aveiro (Portugal) city centre 2014



Continuous measurements: CO, benzene, NO_x, SO₂, PM₁₀, VOC

Temperature, humidity, wind velocity, wind direction, solar radiation, precipitation

COST partners (15 teams joined from 12 COST Countries) installed their microsensors side-by-side to compare performance with referenced equipment in the Air-Quality Mobile Laboratory

AIM of INTERCOMPARISON

- Comparison of performance *Sensors-versus-Analyzers*
- Air Quality Measurements by Sensors in Real Scenario
(**AQ Mobile Lab by IDAD in Aveiro city centre**)
- Targeted Air-Pollutants: NO₂, NO, O₃, CO, SO₂, VOC
- Greenhouse Gases: CO₂, CH₄
- Particulate Matter: PM₁₀, PM_{2.5}, PM_{1.0}, Black Carbon
- Meteorological Parameters: T, RH, p, Wind Velocity and Direction, Solar Radiation, Rainfall/Precipitation

OUTCOME of INTERCOMPARISON

- **Joint-Publication** of Intercomparison Results *Sensors-versus-Analyzers* as *EuNetAir* key output
- **Collaborative Research Team** for future H2020 proposals
- **IPRs** of data by sensor-equipment owner (organization)
- **Share data** of Intercomparison among participating Teams
- **Create Database** of Intercomparison to be managed properly
(*Action webpages with restricted access to members only.*)

Any volunteers for data processing ?)

COST Action TD1105 *EuNetAir*: INTERCOMPARISON

New Sensing Technologies and Modelling for Air-Pollution Monitoring



COST Action TD1105 *EuNetAir*: Intercomparison at Aveiro

Statistics of Action Intercomparison at Aveiro (13-15 Oct. 2014):

e-COST Registered Participants / Total Participants:	20 / 25
Sessions: Group Meeting & Sensors Installation	2
Involved Teams:	15
Participants from Universities:	4 (20%)
Participants from Research Centers:	12 (60%)
Participants from Companies:	4 (20%)
Reimbursed Participants:	14
COST Countries involved in WGs Meeting: <i>Austria, Belgium, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK</i>	12
Gender Balance in Intercomparison:	2 F (10%) 18 M (90%)
Early Stage Researchers (ESRs):	7 (35%)

COST Action TD1105 *EuNetAir*: FGM on Data Analysis at Berlin

Statistics of Action Focus Group Meeting at Berlin (17 Apr. 2015):	
e-COST Registered Participants / Total Participants:	10 / 10
Sessions: Focus Group Meeting	3
Involved Teams:	8
Participants from Universities:	3 (37.5%)
Participants from Research Centers:	4 (50%)
Participants from Companies:	1 (12.5%)
Reimbursed Participants:	10
COST Countries involved in Focus Group Meeting: <i>Belgium, Czech Republic, Germany, Greece, Italy, Portugal, Spain, UK</i>	8
Gender Balance in Focus Group Meeting:	1 F (10%) 9 M (90%)
Early Stage Researchers (ESRs):	6 (60%)

- **Results only for 7 teams out of 15**
- **Problems in data collection efficiency of the sensors related to:**
 - high relative humidity and temperatures;
 - intermittent communication failures;
 - instability and reactivity caused by interfering gases.
- It is important to perform **laboratory experiments** under controlled conditions to determine uncertainties associated to the sensor performance, allowing a better assessment of the **field experiment results**.
- It is necessary to establish an **evaluation protocol** approaching issues as sensitivity, selectivity (known interference), short and long term stability, parametrized sensor equations, data validation and fit for purpose.

REMINDER at Riga, 26-27 March 2015

TEAM	MONITORED VARIABLES	DATA UPDATE STATUS
ECN	PM1, PM2.5, PM10, NO ₂	UPDATED
VITO NV	NO, NO ₂ , CO, O ₃ , VOC, T, RH	UPDATE CONC. UNITS
NILU	CO, NO ₂ , O ₃ , T, RH	UPDATED
SenseAir AB	CO ₂ , CH ₄ , T, RH	UPDATED
IMEC – MSP Team	NO ₂	NO DATA UPLOADED
IDAEA-CSIC (Geotech)	NO, NO ₂ , CO, O ₃	UPDATED
Centre for Atmospheric Science	CO, NO, NO ₂ , O ₃ , SO ₂ , VOC, CO ₂ , PM2.5, PM10, T, RH, WS, WD	VALIDATE CONC. UNITS
3S – Sensors, Signal processing, Systems	VOC, T, RH	UPDATE CONC. UNITS
Aristotle University of Thessaloniki	NO ₂ , O ₃ , T, P, RH	UPDATE CONC. UNITS
SGX – Sensortech	CO, O ₃ , NO ₂	UPDATED
ENEA	NO ₂ , O ₃ , SO ₂ , CO, PM10, T, RH	DATA UPLOADED
SST/ICTM/ELEN	RH, P, T	UPDATED
Materials Center Leoben	CO, H ₂ S, SO ₂ , RH	NO DATA UPLOADED
Siemens AG	VOC, H ₂ , CO, EthOH, O ₃ , T, RH	UPDATE CONC. UNITS
IDAD	CO, NO _x , O ₃ , SO ₂ , PM10, PM2.5, BTEX T, RH, P, WD, WS, SR, PP	UPDATED

COST Action TD1105 *EuNetAir*: FGM on Data Analysis at Berlin

Management of the Aveiro AQ Sensors Database

- **DROPBOX** *by Kostas Karatzas, Aristotle University of Thessaloniki*:
 - Raw Data of AQ Sensors from each Team participating to Intercomparison
 - Partial conversion of the sensor s signal into concentration units
 - **ACTIVATED**
- **FTP SERVER** *by Nuria Castell-Balaguer and Philippe Schneider, NILU*:
 - Raw Data of AQ Sensors from each Team participating to Intercomparison
 - Partial conversion of the sensors signal into concentration units
 - **ACTIVATED**
- **Action Webpages** (www.cost.eunetair.it) **Members Area** *by ENEA*:
 - Raw Data of AQ Sensors from each Team participating to Intercomparison
 - Total conversion of the sensors signal into concentration units
 - Processed Data with computational techniques and learning machine
 - **TO BE ACTIVATED**

Management of the Aveiro AQ Sensors Database:

EuNetAir Webpages Members Area: *Excel Folio for Database*

Excel Folio

by Dr. Valerio Pfister, ENEA
circulated on February 2015

Partners/Teams are
kindly invited to fill the
*Excel Folio for Action
Database* and reply to:
michele.penza@enea.it
valerio.pfister@enea.it

Measurement's Identifier Measurement's Unit Date and Time	MEAS. #1		MEAS. #2		MEAS. #3	
	AFFIL.	IDAD	AFFIL.	IDAD	AFFIL.	IDAD
15/10/14 11.40	4.116		55			
15/10/14 11.41	4.1		54.7			
15/10/14 11.42	4.233		55.1			
15/10/14 11.43	4.396		55			
15/10/14 11.44	4.364		54.8			
15/10/14 11.45	4.312		54.9			
15/10/14 11.46	4.314		54.9			
15/10/14 11.47	4.35		55.4			
15/10/14 11.48	4.522		54.8			
15/10/14 11.49	4.543		54.6			
15/10/14 11.50	4.611		54.8			
15/10/14 11.51	4.577		54.5			
15/10/14 11.52	4.563		54.8			
15/10/14 11.53	4.524		54.8			
15/10/14 11.54	4.464		54.7			
15/10/14 11.55	4.509		54.6			
15/10/14 11.56	4.568		54.8			
15/10/14 11.57	4.529		54.7			
15/10/14 11.58	4.677		54.7			
15/10/14 11.59	4.643		54.5			
15/10/14 12.00	4.57		54.5			
15/10/14 12.01	4.496		54.4			
15/10/14 12.02	4.464		54.5			
15/10/14 12.03	4.555		54.4			
15/10/14 12.04	4.57		54.5			
15/10/14 12.05	4.675		55.1			

Management of the Aveiro AQ Sensors Database: EuNetAir Webpages Members Area (1/6)

AVEIRO (PT) - Joint Measurement Campaign – Summary of the Measurement Database Characteristics

Database ID	Sampling Period	T [°C]	RH [%]	Prec [mm]	WV [m/s]	WD [°N]	p [mBar]	Rad. [W/m2]	PM10 [µg/m3]	PM2.5 [µg/m3]	CO [ppm]	CO2 [ppm]	H2S [ppb]	NO [ppb]	NO2 [ppb]	NOx [ppb]	O3 [ppb]	SO2 [ppb]	Benzene [µg/m3]	Toluene [µg/m3]	Ethylbenzene [µg/m3]	M&P-Xylene [µg/m3]	O-Xylene [µg/m3]	Other Measurements	
IDAD	13/10 00.01 - 27/10 17.00	15'	15'	15'	15'	15'	15'	15'	1h	1h	1'		1'	1'	1'	1'	1'	1'							
	20/10 10.15 - 27/10 17.00																								
	22/10 18.00 - 27/10 17.00																			15'	15'	15'	15'	15'	
CAM 10	14/10 00.30 - 27/10 14.29	1'	1'		1'	1'			1'	1'		1'												VOC	1'
CAM 11	14/10 00.30 - 27/10 14.29	1'	1'		1'	1'			1'	1'	1'	1'		1'	1'		1'	1'						VOC	1'
ECN - b 38	14/10 09.51 - 27/10 14.10								1'	1'														PM1	1'
ECN - b 10	15/10 14.00 - 27/10 14.59								1'	1'					1'									PM1	1'
ENEA	14/10 18.00 - 15/10 05.00	15'	15'						15'						15'		15'	15'							
	15/10 16.00 - 17/10 14.00	1h	1h						1h		1h				1h		1h	1h							
	18/10 16.00 - 23/10 07.00	1h	1h						1h		1h				1h		1h	1h							
IDAEA - CSIC	13/10 00.15 - 27/10 17.00										15'														
	13/10 00.15 - 18/10 11.00													15'	15'		15'								
ISAG	14/10 14.50 - 28/10 13.00	5'	5'				5'								5'		5'								
NILU	13/10 15.00 - 22/10 15.45	5'	5'								5'				5'		5'								
Siemens	13/10 16.02 - 27/10 16.03	1'	1'																					Meas. #1+6	1'
U.C. Louvain	13/10 12.53 - 28/10 15.41	1s	1s				1s																		

Management of the Aveiro AQ Sensors Database: EuNetAir Webpages Members Area (2/6)

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12.00)

IDAD

Reference Person for the meas. database: **Ana Margarida COSTA**

Sampling Period

Period Label	beginning	end
#1	13/10 00.01	27/10 17.00
#2	20/10 10.15	27/10 17.00
#3	22/10 18.00	27/10 17.00

Database Characteristic

parameter	meas. unit	sampling period	sampling rate
Benzene	[ug/m3]	#3	1 rec/15 min
CO	[ppm]	#1	1 rec/1 min
CO2	[ppm]	#2	1 rec/15 min
Ethylbenzene	[ug/m3]	#3	1 rec/15 min
H2S	[ppb]	#1	1 rec/1 min
M&P-Xylene	[ug/m3]	#3	1 rec/15 min
NO	[ppb]	#1	1 rec/1 min
NO2	[ppb]	#1	1 rec/1 min
NOx	[ppb]	#1	1 rec/1 min
O3	[ppb]	#1	1 rec/1 min
O-Xylene	[ug/m3]	#3	1 rec/15 min
p	[mbar]	#1	1 rec/15 min
PM10	[ug/m3]	#1	1 rec/1 hour
PM2.5	[ug/m3]	#1	1 rec/1 hour
precipitation	[mm]	#1	1 rec/15 min
Rad.	[W/m2]	#1	1 rec/15 min
RH	[%]	#1	1 rec/15 min
SO2	[ppb]	#1	1 rec/1 min
T	[°C]	#1	1 rec/15 min
Toluene	[ug/m3]	#3	1 rec/15 min
WD	[°N]	#1	1 rec/15 min
WS	[m/s]	#1	1 rec/15 min

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12.00)

CAM

Reference Person for the meas. database: **Paul SMITH**

Sampling Period

Period Label	beginning	end
#1	14/10 00.30	27/10 14.29

Database Characteristic

database: CAM_10

parameter	meas. unit	sampling period	sampling rate
CO2	[ppb]	#1	1 rec/1 min
PM10	[ug/m3]	#1	1 rec/1 min
PM2.5	[ug/m3]	#1	1 rec/1 min
RH	[%]	#1	1 rec/1 min
T	[°C]	#1	1 rec/1 min
VOC	[ppb]	#1	1 rec/1 min
WD	[°]	#1	1 rec/1 min
WS	[m/s]	#1	1 rec/1 min

Database Characteristic

database: CAM_11

parameter	meas. unit	sampling period	sampling rate
CO	[ppb]	#1	1 rec/1 min
CO2	[ppb]	#1	1 rec/1 min
NO	[ppb]	#1	1 rec/1 min
NO2	[ppb]	#1	1 rec/1 min
O3	[ppb]	#1	1 rec/1 min
PM10	[ug/m3]	#1	1 rec/1 min
PM2.5	[ug/m3]	#1	1 rec/1 min
RH	[%]	#1	1 rec/1 min
SO2	[ppb]	#1	1 rec/1 min
T	[°C]	#1	1 rec/1 min
VOC	[ppb]	#1	1 rec/1 min
WD	[°]	#1	1 rec/1 min
WS	[m/s]	#1	1 rec/1 min

Management of the Aveiro AQ Sensors Database: EuNetAir Webpages Members Area (3/6)

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12:00)

ECN

Reference Person for the meas. database: **Ernje WEUERS**

Sampling Period

Period Label	beginning	end
#1	14/10 09.51	27/10 14.10
#2	15/10 14.00	27/10 14.59

Database Characteristic database: Box 10

parameter	meas. unit	sampling period	sampling rate
NO2	[ug/m3]	#2	1 rec/1 min
PM1	[ug/m3]	#2	1 rec/1 min
PM10	[ug/m3]	#2	1 rec/1 min
PM2.5	[ug/m3]	#2	1 rec/1 min

Database Characteristic database: Box 38

parameter	meas. unit	sampling period	sampling rate
PM1	[ug/m3]	#1	1 rec/1 min
PM10	[ug/m3]	#1	1 rec/1 min
PM2.5	[ug/m3]	#1	1 rec/1 min

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12:00)

ENEA

Reference Person for the meas. database: **Michele PENZA**

Sampling Period

Period Label	beginning	end
#1	14/10 18.00	15/10 05.00
#2	15/10 16.00	17/10 14.00
#3	18/10 16.00	23/10 07.00

Database Characteristic

parameter	meas. unit	sampling period	sampling rate
CO	[ppm]	#2	1 rec/1 hour
		#3	1 rec/1 hour
		#1	1 rec/15 min
NO2	[ppb]	#2	1 rec/1 hour
		#3	1 rec/1 hour
		#1	1 rec/15 min
O3	[ppb]	#2	1 rec/1 hour
		#3	1 rec/1 hour
		#1	1 rec/15 min
PM10	[ug/m3]	#2	1 rec/1 hour
		#3	1 rec/1 hour
		#1	1 rec/15 min
RH	[%]	#2	1 rec/1 hour
		#3	1 rec/1 hour
		#1	1 rec/15 min
SO2	[ppb]	#2	1 rec/1 hour
		#3	1 rec/1 hour
		#1	1 rec/15 min
T	[°C]	#2	1 rec/1 hour
		#3	1 rec/1 hour
		#1	1 rec/15 min

Management of the Aveiro AQ Sensors Database: EuNetAir Webpages Members Area (4/6)

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12.00)

IDAEA-CSIC

Reference Person for the meas. database: **Mar VIANA**

Sampling Period

Period Label	beginning	end
#1	13/10 00.15	27/10 17.00
#2	13/10 00.15	18/10 11.00

Database Characteristic

parameter	meas. unit	sampling period	sampling rate
CO	[ppm]	#1	1 rec/15 min
NO	[ppb]	#2	1 rec/15 min
NO2	[ppb]	#2	1 rec/15 min
O3	[ppb]	#2	1 rec/15 min

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12.00)

ISAG

Reference Person for the meas. database: **Kostas KARATZAS**

Sampling Period

Period Label	beginning	end
#1	14/10 14.50	28/10 13.00

Database Characteristic

parameter	meas. unit	sampling period	sampling rate
NO2	[ppm]	#1	1 rec/5 min
O3	[ppb]	#1	1 rec/5 min
p	[kPa]	#1	1 rec/5 min
RH	[%]	#1	1 rec/5 min
T	[°C]	#1	1 rec/5 min

Management of the Aveiro AQ Sensors Database: EuNetAir Webpages Members Area (5/6)

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12.00)

NILU

Reference Person for the meas. database: **Nuria CASTELL**

Sampling Period

Period Label	beginning	end
#1	13/10 15.00	22/10 15.45

Database Characteristic

parameter	meas. unit	sampling period	sampling rate
CO	[ppm]	#1	1 rec/5 min
NO2	[ppb]	#1	1 rec/5 min
O3	[ppb]	#1	1 rec/5 min
RH	[°C]	#1	1 rec/5 min
T	[°C]	#1	1 rec/5 min

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12.00)

Siemens

Reference Person for the meas. database: **Oliver VON SICARD**

Sampling Period

Period Label	beginning	end
#1	13/10 16.02	27/10 16.03

Database Characteristic

parameter	meas. unit	sampling period	sampling rate
Meas #1	[Ohm]	#1	1 rec/1 min
Meas #2	[Ohm]	#1	1 rec/1 min
Meas #3	[Ohm]	#1	1 rec/1 min
Meas #4	[mA]	#1	1 rec/1 min
Meas #5	[digital cou	#1	1 rec/1 min
Meas #6	[digital cou	#1	1 rec/1 min
RH	[%]	#1	1 rec/1 min
T	[°C]	#1	1 rec/1 min

Management of the Aveiro AQ Sensors Database: EuNetAir Webpages Members Area (6/6)

AVEIRO (PT) - Joint Measurement Campaign

Measurement Database Characteristics (last check on Nilu's server: 13/04/2015 12.00)

U.C. Louvain

Reference Person for the meas. database: **Nicolas ANDRÉ**

Sampling Period

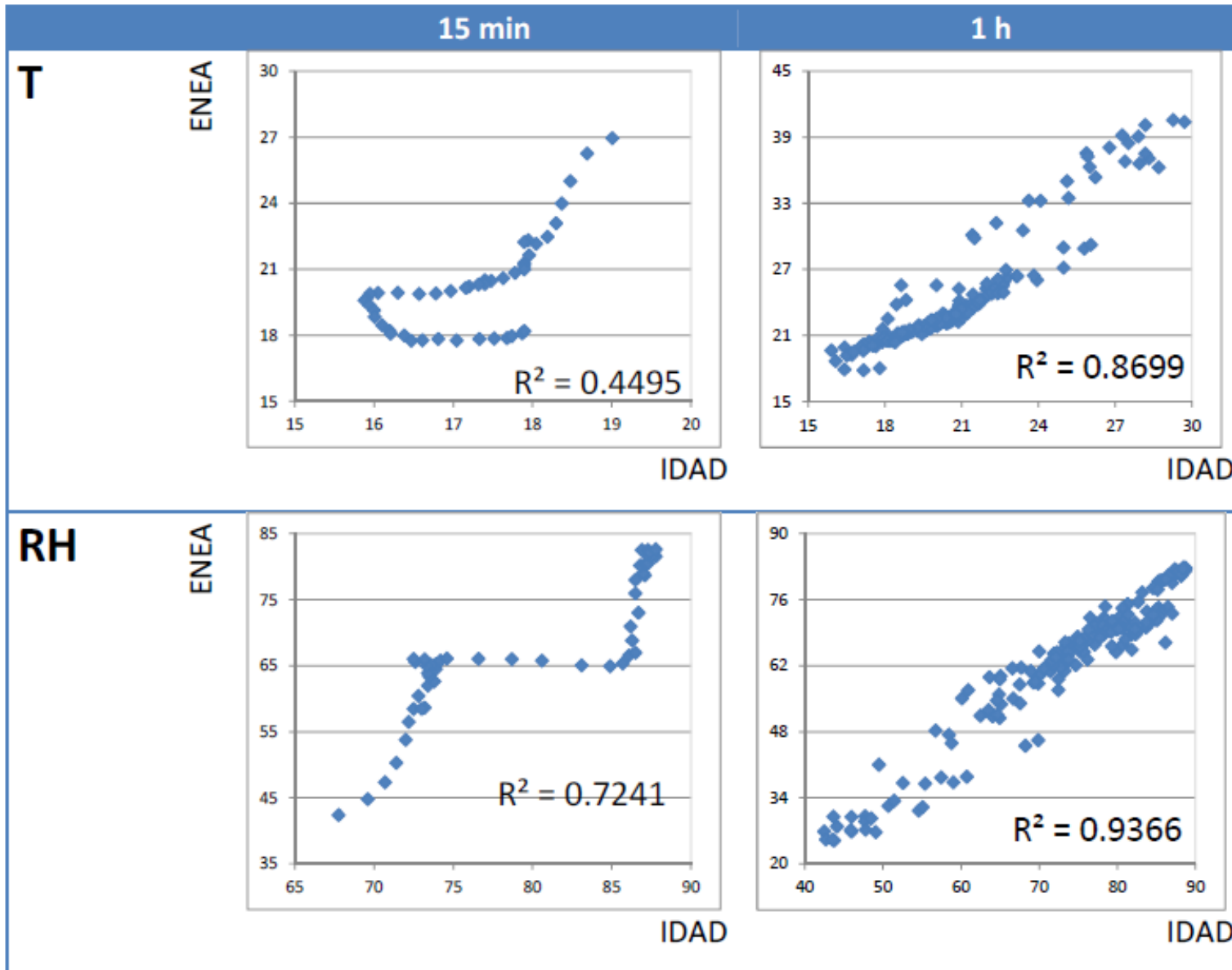
Period Label	beginning	end
#1	13/10 12.53	28/10 15.41

Database Characteristic

parameter	meas. unit	sampling period	sampling rate
p	[Pa]	#1	1 rec/1 sec
RH	[Hz]	#1	1 rec/1 sec
T	[°C]	#1	1 rec/1 sec

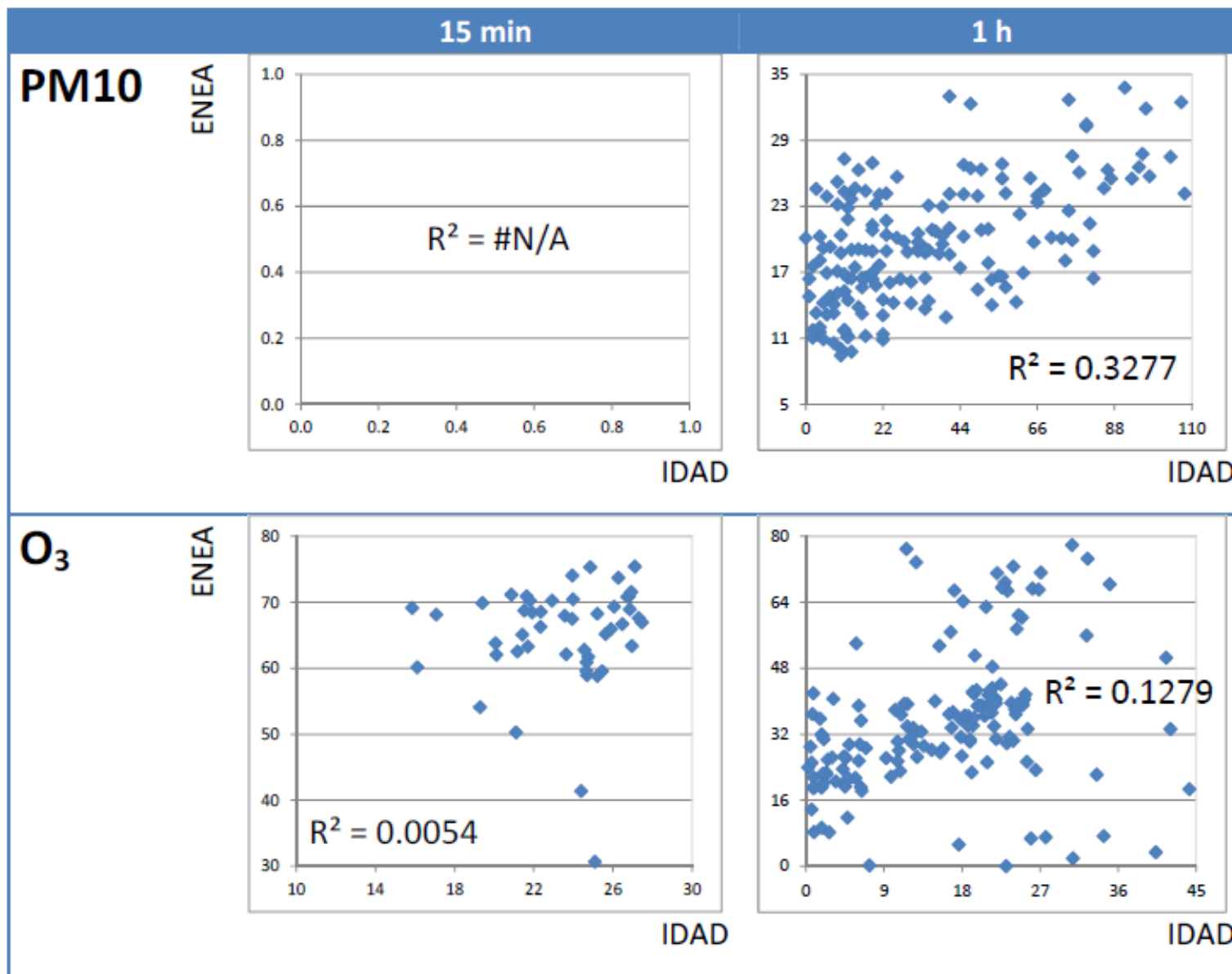
Management of the Aveiro AQ Sensors Database:

EuNetAir Webpages Members Area: **ENEA** (1/4)



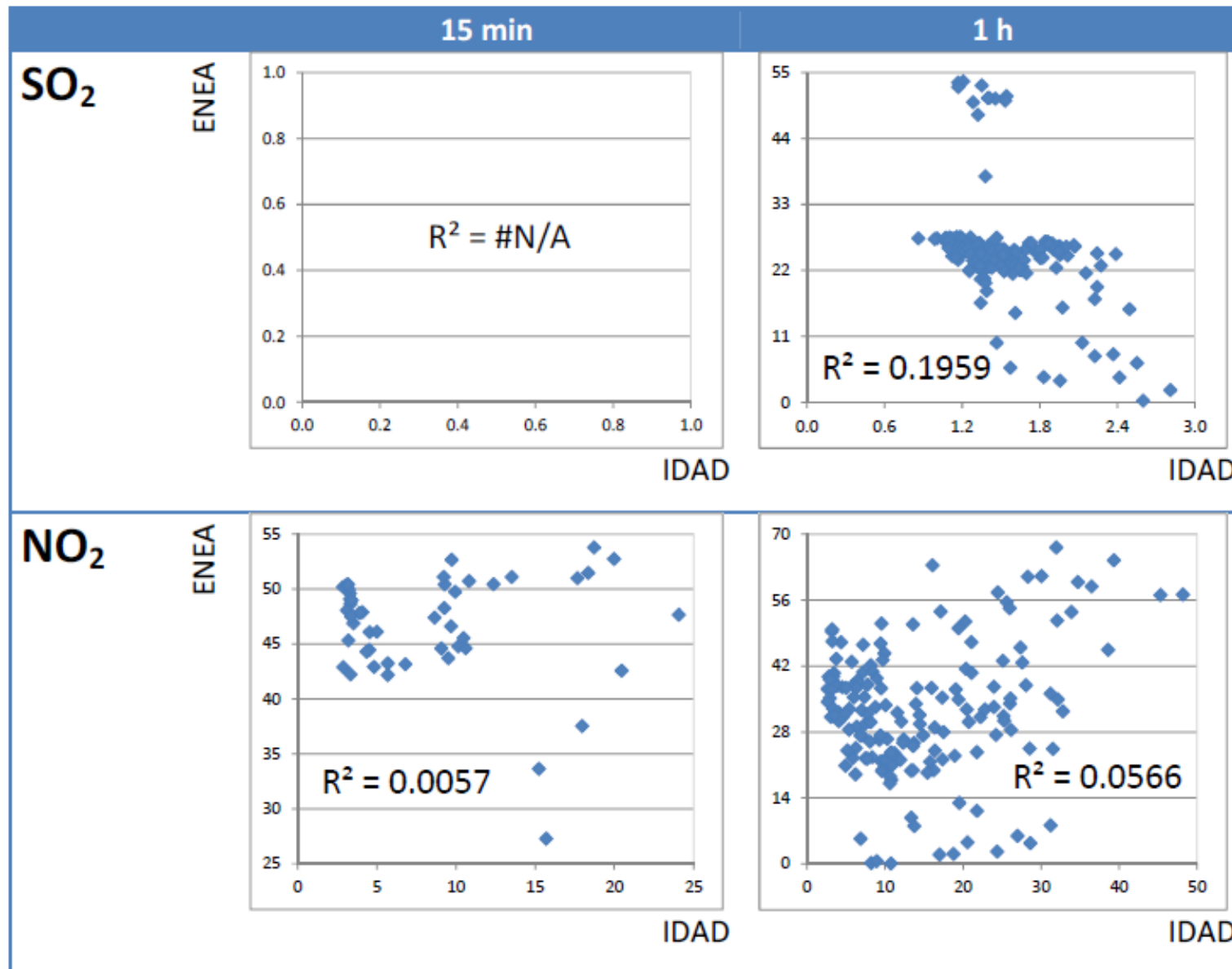
Management of the Aveiro AQ Sensors Database:

EuNetAir Webpages Members Area: ENEA (2/4)



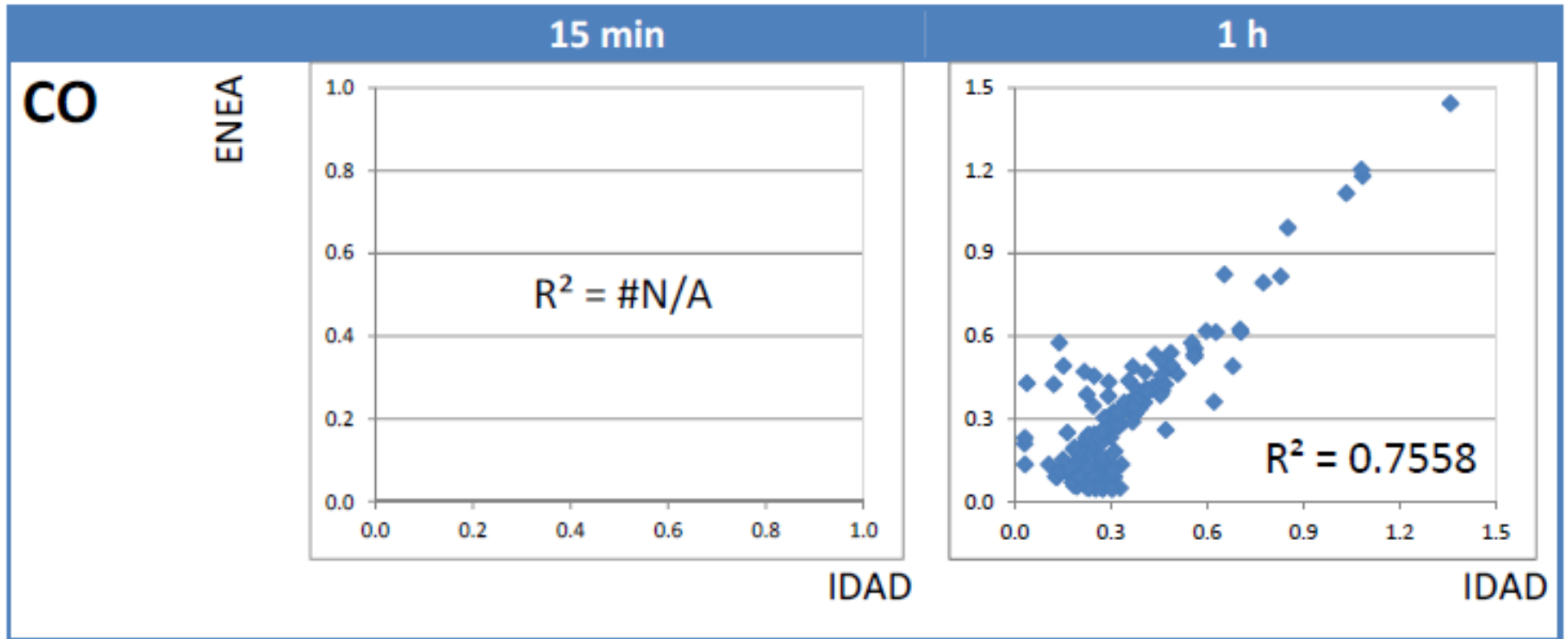
Management of the Aveiro AQ Sensors Database:

EuNetAir Webpages Members Area: **ENEA** (3/4)



Management of the Aveiro AQ Sensors Database:

EuNetAir Webpages Members Area: ENEA (4/4)



Best case: CO sensor measurement !

Management of the Aveiro AQ Sensors Database:

EuNetAir Webpages Members Area: *Proposal for Database*

Strategy to manage database and criteria for organization

Meteorological Parameters	PM	GASES	VOCs
<ul style="list-style-type: none">• T• RH• Precipitation/Rain• Wind Direction• Wind Velocity• Solar Radiation• Atm. Pressure	<ul style="list-style-type: none">• PM_{1.0}• PM_{2.5}• PM₁₀	<ul style="list-style-type: none">• CO• CO₂• NO• NO₂• NO_x• O₃• SO₂• H₂S	<ul style="list-style-type: none">• Benzene• EthylBenzene• Xylene (o, m, p)• Toluene
Blu Colour	Gray Colour	Red Colour	Green Colour

COST Action TD1105 *EuNetAir*: FGM on Data Analysis at Berlin

Proposals for Management of the Aveiro AQ Sensors Database

- Preliminary Processing of Database at Berlin: First Definitions
- Further Work on Aveiro Database
- Planning of Database to be installed **under Action Webpages**
- Processing of AQ Sensors Database with Computational Methods and Learning Techniques
- Planning of Joint-Publication(s)
- Planning of a Report on Aveiro Database as Action Output

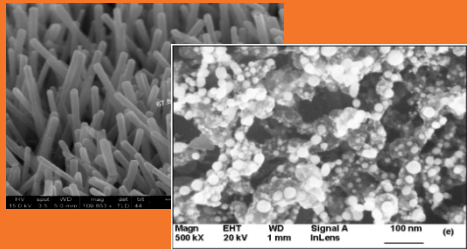


Expected Impact by Action TD1105

- **European Leadership on AQC Science & Technology**
- **Development of Green-Economy**
- **Support to Sustainable Development**
- **Support to Monitoring System of Clean Air for Europe**
- **Fostering Research & Innovation on New Sensing Technologies for Environmental Monitoring**

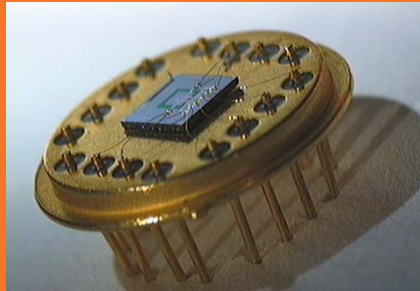
COST Action EuNetAir: CHALLENGES

MATERIALS & GAS SENSORS



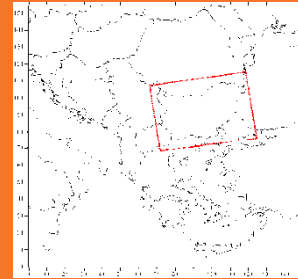
MOX by UNIBS IREC UB SICCAS
CNT by ENEA NASA URV CSIRO

AQC SENSORS & SYSTEMS



GasFET by EPFL, Switzerland

AQ MODELLING

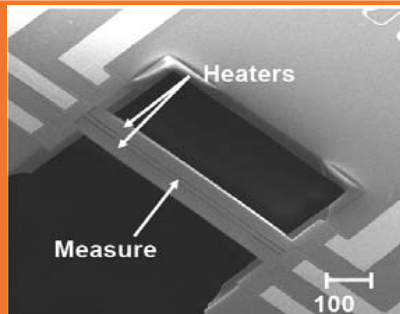


CMAQ Calculations
by NIMH, BG

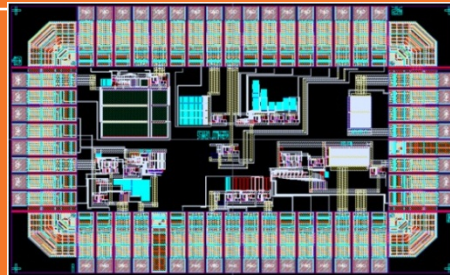
STANDARDS & PROTOCOLS



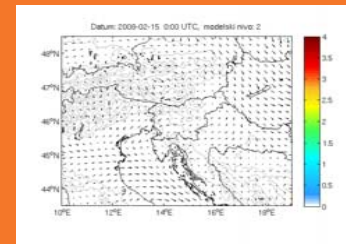
Dynamic Olfactometry (EN 13725/2003) by Univ. of Bari and Lenviros srl, IT



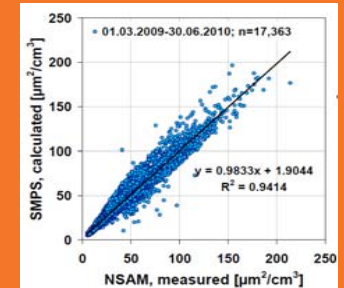
Cantilever Sensor by DTU, DK



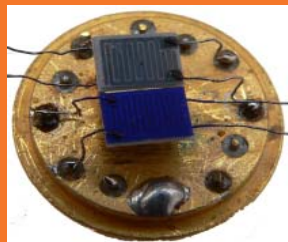
ASIC Circuit: CMOS SOI
by WARWICK & CCMOS Ltd, UK



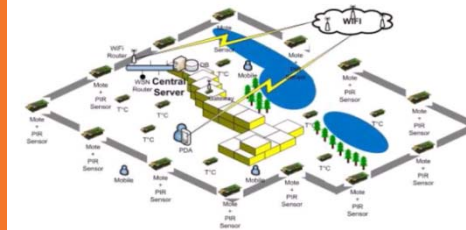
AQ Modelling dispersion in meteorological mesoscale by University of Ljubljana, SL



Particle Surface Area Measurements by IUTA eV, DE



Phtalocyanine Gas Sensors
by CNRS UBP-LASMEA, FR



WIRELESS SENSORS NETWORK
by ISI, Greece



Chemical Weather Forecasting and Information System
by Hungarian Meteo Service



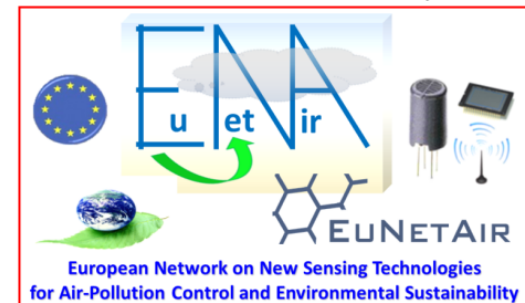
HARMONISATION:
Definition of protocols and standards for gas sensing measurements and gas sensors

CONCLUSIONS

The COST Action TD1105 *EuNetAir* is proposed to solve problems in the area of:

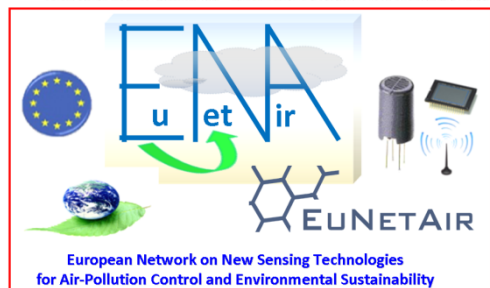
- Air Quality Control
- Environmental Sustainability
- Indoor/Outdoor Energy Efficiency
- Climate Change Monitoring
- Health Effects of Air-Pollution

European Network on New Sensing Technologies for Air-Pollution Control and Environmental Sustainability - EuNetAir



Contact Details

 **cost**
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY



CSO Approval: 01 Dec. 2011

Kick-off Meeting: 16 May 2012

Start of Grant: 01 July 2012

End of Grant: 30 June 2016

www.cost.eunetair.it

MC Chair:

Dr. Michele Penza, ENEA, IT
michele.penza@enea.it

MC Vice Chair:

Prof. Anita Lloyd Spetz
Linköping University, SE
spetz@ifm.liu.se

Grant Holder:

Dr. Corinna Hahn, Dr. Juliane Rossbach
Eurice GmbH, DE
c.hahn@eurice.eu; j.rossbach@eurice.eu

Scientific Secretary:

Dr. Annamaria Demarinis Loiotile
annamaria.demarinis@uniba.it

Science Officer:

Dr. Deniz Karaca
deniz.karaca@cost.eu

Administrative Officer:

Dr. Andrea Tortajada
andrea.tortajada@cost.eu

Rapporteur ESSEM:

Prof. Kostantinos Kourtidis (GR)
kourtidi@env.duth.gr

Rapporteur MPNS:

Prof. Joaquim Manuel Vieira (PT)
vieira@cv.ua.pt

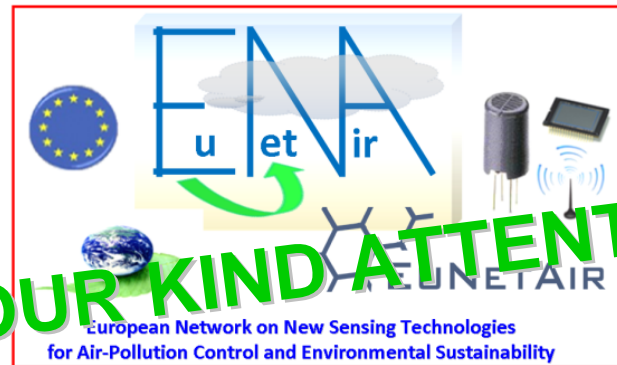
Rapporteur CMST:

Prof. Antonio Lagana (IT)
lagana05@gmail.com

http://www.cost.eu/domains_actions/essem/Actions/TD1105

ACKNOWLEDGEMENTS

Berlin, Germany, 17 April 2015



THANK YOU VERY MUCH FOR YOUR KIND ATTENTION!

